Sample Paper – Understanding Quadrilaterals (Class 8)

Section A – Very Short Answer Questions (1 Mark Each)

1. **The angles of a quadrilateral are in the ratio 1:2:3:4. Find the measure of each angle.**
2. **A convex polygon has 20 diagonals. Find the number of its sides.**
3. **A regular polygon has an interior angle of 156°. Find the number of sides.**
4. **The sum of the interior angles of a polygon is twice the sum of its exterior angles. Find the number of sides of the polygon.**
5. **One angle of a parallelogram is 3 times its adjacent angle. Find all the angles of the parallelogram.**

Section B – Short Answer Questions (2 Marks Each)

6. **The sum of the measures of the interior angles of a polygon is 1980°. Find the number of sides.**
7. **A quadrilateral has three angles as 85°, 95°, and 110°. Find the fourth angle and classify the quadrilateral.**
8. **In a parallelogram, one angle is 20° more than twice the other. Find all the angles.**
9. **A polygon has 15 sides. Find the sum of its interior angles and the measure of each exterior angle if the polygon is regular.**
10. **Find the number of sides of a polygon if each exterior angle measures 24°.**

Section C – Long Answer Questions

11. **A quadrilateral ABCD has the sum of opposite angles as 180°. Prove that ABCD is a cyclic quadrilateral.**
12. **A rhombus has a perimeter of 40 cm and one of its diagonals is 16 cm. Find the length of the other diagonal.**
13. **A rectangle and a rhombus have the same perimeter. If the length of the rectangle is 18 cm and breadth is 10 cm, find the side of the rhombus.**
14. **A parallelogram has adjacent angles in the ratio 3:7. Find all its angles.**
15. **A regular polygon has 10 sides. Find the difference between an interior and exterior angle of this polygon**

Section D – Application-Based Questions

16. **A quadrilateral has sides 7 cm, 10 cm, 12 cm, and 15 cm. If its perimeter increases by 40%, find the new perimeter.**

17. **A park is in the shape of a quadrilateral. The angles of the park are in the ratio 2:3:5:6. Find each angle and determine the type of quadrilateral.**
18. **A quadrilateral is divided into two triangles by a diagonal. If the angles of one triangle are 40°, 60°, and 80°, find the four angles of the quadrilateral.**
19. **The exterior angles of a quadrilateral are in the ratio 1:2:3:4. Find the measure of each exterior angle.**
20. **The sum of the interior angles of a polygon is 2160°. Find the number of sides and the measure of each exterior angle of this polygon.**

Answers - Solutions of Questions

Section A– Very Short Answer Questions

1. **The angles of a quadrilateral are in the ratio 1:2:3:4. Find the measure of each angle.**
   - Let the angles be **x, 2x, 3x, 4x**
   - Sum of angles = 360°
     → x + 2x + 3x + 4x = 360°
     → 10x = 360°
     → x = 36°
   - Angles: **36°, 72°, 108°, 144°**
2. **A convex polygon has 20 diagonals. Find the number of its sides.**
   - Formula: **n(n-3)/2 = 20**
     → n(n-3) = 40
     → n^2 - 3n - 40 = 0
     → (n-8)(n+5) = 0
     → n = 8 (only positive value is valid)
   - Answer: **Octagon (8 sides)**
3. **A regular polygon has an interior angle of 156°. Find the number of sides.**
   - Exterior angle = 180° - 156° = **24°**
   - Number of sides = 360° / 24° = **15 sides**
4. **The sum of the interior angles of a polygon is twice the sum of its exterior angles. Find the number of sides.**
   - Interior sum = 2 × Exterior sum
     → (n-2) × 180° = 2 × 360°
     → (n-2) × 180° = 720°
     → n-2 = 4
     → n = **6 sides (Hexagon)**
5. **One angle of a parallelogram is 3 times its adjacent angle. Find all the angles.**
   - Let the smaller angle be **x**
     → The larger angle = **3x**

- Sum of adjacent angles in a parallelogram = 180°
  → x + 3x = 180°
  → 4x = 180°
  → x = 45°
- Angles: **45°, 135°, 45°, 135°**

Section B – Short Answer Questions

6. **The sum of the measures of the interior angles of a polygon is 1980°. Find the number of sides.**
   - Formula: **(n-2) × 180° = 1980°**
     → n-2 = 11
     → n = **13 sides**
7. **A quadrilateral has three angles as 85°, 95°, and 110°. Find the fourth angle and classify the quadrilateral.**
   - Sum of quadrilateral = 360°
     → Fourth angle = 360° - (85° + 95° + 110°)
     → 360° - 290° = **70°**
   - Since no sides are given, it's an **irregular quadrilateral.**
8. **In a parallelogram, one angle is 20° more than twice the other. Find all the angles.**
   - Let smaller angle be **x**, then larger angle = **2x + 20°**
   - Sum of adjacent angles = 180°
     → x + 2x + 20° = 180°
     → 3x + 20° = 180°
     → 3x = 160°
     → x = 53.33°
   - Angles: **53.33°, 126.67°, 53.33°, 126.67°**
9. **A polygon has 15 sides. Find the sum of its interior angles and each exterior angle if it is regular.**
   - Interior sum = (15-2) × 180° = **2340°**
   - Exterior angle = 360° / 15 = **24°**
10. **Find the number of sides of a polygon if each exterior angle measures 24°.**

- n = 360° / 24° = **15 sides**

Section C – Long Answer Questions

11. **A quadrilateral ABCD has the sum of opposite angles as 180°. Prove that ABCD is a cyclic quadrilateral.**

- A quadrilateral is cyclic if opposite angles sum to **180°**
- Given: **∠A + ∠C = 180°** and **∠B + ∠D = 180°**
- Hence, **ABCD is a cyclic quadrilateral (proved).**

12. **A rhombus has a perimeter of 40 cm and one diagonal is 16 cm. Find the other diagonal.**

- Side of rhombus = 40 cm / 4 = **10 cm**
- Diagonals bisect at 90° → Pythagoras theorem
  → (Other diagonal/2)² + (8)² = 10²
  → x² + 64 = 100
  → x² = 36 → x = **12 cm**
- Other diagonal = **24 cm**

13. **A rectangle and a rhombus have the same perimeter. If the rectangle's length is 18 cm and breadth is 10 cm, find the side of the rhombus.**

- Rectangle Perimeter = 2(18+10) = **56 cm**
- Rhombus Perimeter = 4 × Side
- Side = **56 cm / 4 = 14 cm**

14. **A parallelogram has adjacent angles in the ratio 3:7. Find all its angles.**

- Let angles be **3x, 7x**
- 3x + 7x = 180°
- x = **18°**
- Angles: **54°, 126°, 54°, 126°**

15. **A regular polygon has 10 sides. Find the difference between an interior and exterior angle.**

- Interior angle = **144°**, Exterior angle = **36°**
- Difference = **144° - 36° = 108°**

Section D – Application-Based Questions

16. **Perimeter increase by 40%**

- Original Perimeter = 7+10+12+15 = **44 cm**
- New Perimeter = **44 + 40% of 44 = 61.6 cm**

17. **Angles of a quadrilateral (2:3:5:6)**

- $2x + 3x + 5x + 6x = 360°$
- $x = 20°$
- Angles: **40°, 60°, 100°, 120°**

18. **Quadrilateral from two triangles**

- Quadrilateral = 40°, 60°, 80°, **180° - 80° = 100°**

19. **Exterior angles in 1:2:3:4**

- $x + 2x + 3x + 4x = 360°$
- $10x = 360°$
- $x = 36°$
- Angles: **36°, 72°, 108°, 144°**

20. **Sum of angles = 2160°**

- $n = (2160°/180°) + 2 =$ **14 sides**
- Exterior angle = 360°/14 = **25.7°**